REMARKS/ARGUMENTS

Claims 1-47 are pending and rejected in the application. In view of the following remarks, Applicants respectfully request allowance of the application.

ISSUE REGARDING REFERENCES CITED

The Office has cited, at least for dependent claims 17-19, a reference referred to as "Hurst," however the patent number given as corresponding to this reference (i.e., US 6,915,018) actually corresponds to the Tajime reference used for various other rejections. Additionally, the Hurst reference does not appear in the "Notice of references cited" sent together with the current Office Action.

On February 10, 2010, the undersigned's secretary spoke with the Examiner regarding this issue, and was told that the correct patent number for the Hurst reference is US 5,731,837. Applicants respectfully request that the Examiner corrects the error in the next official communication.

CLAIM REJECTIONS – 35 USC § 103

Claims 1-4, 13-14, 28-31 and 40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tajime, U.S. Pat. No. 6,915,018 in view of Hanamura et al., (hereinafter "Hanamura"), U.S. Pat. No. 6,587,508 in view of Yanagihara, U.S. Pat. No. 5,374,958 and further in view of Ribas-Corbera et al., (hereinafter "Ribas-Corbera"), U.S. Pat. No. 6,111,991. Claims 5 and 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tajime, in view of Hanamura, in view of Yanagihara, in view of Ribas-Corbera, and further in view of Nishikawa et al., (hereinafter "Nishikawa"), U.S. Pat. No. 6,222,887. Claims 6 and 33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tajime, in view of Hanamura, in view of Yanagihara, in view of Ribas-Corbera, and further in view of Nagumo et al., (hereinafter "Nagumo"), U.S. Pat. No. 7,158,570. Claims 7 and 34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tajime, in view of Hanamura, in view of Yanagihara, in view of Ribas-Corbera, in view of Hsia, U.S. Publ. No. 2004/0146108 and further in view of Sugiyama, U.S. Pat. No. 6,940,911. Claims 8 and 35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tajime, in view of Hanamura, in view of Yanagihara, in view of Ribas-

Corbera, and further in view of Chiang et al., (hereinafter "Chiang"), U.S. Pat. No. 6,192,081. Claims 9 and 36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tajime, in view of Hanamura, in view of Yanagihara, in view of Ribas-Corbera, and further in view of Riek et al., (hereinafter "Riek"), U.S. Pat. No. 7,148,908. Claims 10-12 and 37-39 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tajime, in view of Hanamura, in view of Yanagihara, in view of Ribas-Corbera, and further in view of Hui, U.S. Pat. No. 6,654,417. Claims 15-16 and 41 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia, in view of Ribas-Corbera. Claims 17-19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia, in view of Ribas-Corbera, and further in view of Hurst, Jr., U.S. Pat. No. (5,731,837). Claim 20 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hsia, in view of Ribas-Corbera, and further in view of Mitchell et al., (hereinafter "Mitchell", U.S. Pat. No. 6,256,422. Claims 21-27 and 42-47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Pau, U.S. Pat. No. 6,223,193 in view of Ar, U.S. Pat. No. 5,526,052.

CLAIMS 1-14 AND 28-41 DEFINE OVER THE PRIOR ART

Independent claim 1 recites, in part:

> ***determining a target bitrate for a picture*** in the sequence based on an estimate of the ***picture's complexity***,
>
> generating a first quantizer estimate for the picture ***based on a fullness indicator*** from a transmit buffer of a video coder,
>
> generating a second quantizer estimate for the picture ***based on*** **[1]** ***a linear regression of quantizer assignments*** made to prior pictures of a same type, **[2]** actual coding rates achieved by such quantizer assignments and **[3]** the target bitrate, and
>
> selecting a quantizer ***based on a difference between the two quantizer estimates*** and based on the estimate of the picture's complexity.

The cited art, even if considered in combination, does not teach or suggest the rate control method recited in claim 1. Claim 1 by its own terms requires generation of two quantizer estimates each based on different sets of data, then selection of a final quantizer based on a comparison of the two estimates. No reference contains any disclosure to select a quantizer based on a comparison of two quantizer estimates as claimed.

The Office asserts that Tajime discloses determining a target bitrate for a picture in the sequence based on an estimate of the picture's complexity. Applicants respectfully disagree. Tajime's "target average bitrate" is "supplied from outside" and there is no teaching or suggestion that it is determined for a particular picture based on an estimate of that picture's complexity. (Tajime, 8:4-5).

Tajime also does not disclose generating a first quantizer estimate for the picture ***based on a fullness indicator*** from a transmit buffer of a video coder. As teaching this element, the Office says that in Tajime "the feedback loop from the coder provides the buffer fullness indication," but the Office admits that Tajime "does not explicitly state a buffer full indicator." (Office Action dated April 13, 2009, pg. 4). Applicants agree as there is no mention in Tajime of a "buffer" or a "feedback loop." The Office says that Hanamura "teaches the use of a buffer fullness indicator from a transmit buffer." However, Hanamura's buffer is a ***virtual*** buffer, not a ***transmit*** buffer as is claimed, and as is known in the art (and discussed in the specification), virtual and transmit buffers are not the same thing.

The Office asserts further that Yanagihara discloses the claimed second quantizer estimate at Figures 11 and 14, 12:6-9, 12:20-38 and 13:62-14:12, however, Applicants can find no teaching or suggestion that a second quantizer estimate is generated from **[1]** a linear regression of quantizer assignments made to prior pictures of a same type, **[2]** actual coding rates achieved by such quantizer assignments and **[3]** the target bitrate. Regarding **[1]**, the Office has admitted that Tajime does not disclose linear regression techniques and has referred to Ribas-Corbera for such disclosure (discussed below).

Regarding **[2]**, Applicants can find no teaching or suggestion in the cited portions of Yanagihara of a quantizer estimate for a picture being generated based on actual coding rates achieved by quantizer assignments made to prior pictures of a same type. Indeed, it seems Yanagihara's estimator does not use prior pictures' actual coding rates in its calculus, much less prior pictures of a same type; in fact, Yanagihara does not mention picture types at all.

Regarding **[3]**, Applicants can find in Yanagihara no mention of a target bitrate, or even just a bitrate generally, much less a teaching or suggestion that such a target bitrate is one of three elements used to generate a second quantizer estimate for a picture.

Claim 1 goes further and requires a comparison of the two quantizer estimates – "selecting a quantizer ***based on a difference between the two quantizer estimates*** and based on the estimate of the picture's complexity." Though asserted by the Office, Yanagihara has no disclosure corresponding to this element, either. The undersigned reviewed the portions cited by the Office, but has found nothing to disclose any difference taken between two separate quantizer estimates. The cited art simply does not teach or suggest this subject matter.

Ribas-Corbera is cited for disclosure of linear regression in the abstract. Ribas-Corbera has no disclosure of a quantizer estimate that is generated from **[1]** a linear regression of quantizer assignments made to prior pictures of a same type, **[2]** actual coding rates achieved by such quantizer assignments and **[3]** the target bitrate. Moreover, Ribas-Corbera has no disclosure of a difference taken between two quantizer estimates as claimed. Accordingly, this art, even if considered in combination, fails to teach or suggest all elements of claim 1.

For at least these reasons, Applicants believe that the rejections of claim 1, and claim 28, which recites elements similar to those of claim 1, should be reconsidered and withdrawn. Claims 2-14 and 29-41 depend from independent claims 1 and 28, respectively, and, therefore, are allowable for at least the reasons applicable to claims 1 and 28, even before they are considered on their merits.

CLAIMS 4 AND 31 DEFINE OVER THE PRIOR ART

Claim 4 recites:

> The rate control method of claim 1, wherein the estimate of the picture's complexity is determined by analyzing a number of bits used to represent each pixel in the picture.

The combination of Tajime, Hanamura, Yanagihara and Ribas-Corbera does not teach or suggest determining an estimate of picture complexity by analyzing a ***number of bits*** used to represent each ***pixel*** in the picture, which estimate is used to influence the selection of a quantizer. Indeed, the cited portions of Tajime and Yanagihara do not mention pixels at all.

For at least these reasons, Applicants believe that the rejections of claim 4, and claim 31, which recites elements similar to those of claim 4, should be reconsidered and withdrawn.

CLAIMS 6 AND 33 DEFINE OVER THE PRIOR ART

Dependent claim 6 recites:

> The rate control method of claim 1, further comprising selectively canceling motion vectors of coded blocks in the picture according to a rate control policy selected for the picture.

The combination of Tajime, Hanamura, Yanagihara, Nagumo and Ribas-Corbera does not teach or suggest the rate control method recited in claim 6. The cited portions of Nagumo refer to "[generating] the motion vector rededection flag" when "canceling the exclusion of the excluded frame image data by rising the frame rate of the motion picture data...," which is not at all the same thing as ***selectively*** canceling ***motion vectors*** of coded blocks in the picture ***according to*** a ***rate control policy*** selected for the picture. (Nagumo, 20:21-31).

For at least these reasons, Applicants believe that the rejections of claim 6, and claim 33, which recites elements similar to those of claim 6, should be reconsidered and withdrawn.

CLAIMS 15-20 DEFINE OVER THE PRIOR ART

Independent claim 15 recites:

> A rate controller, comprising:
>
> a scene content analyzer having an input for source video data and an output for complexity indicators representing complexity of each picture in the source video data,
>
> a first quantizer estimator having an input for the source video data and complexity indicators, to generate a quantizer estimate of a picture based on a calculation of a target rate for coding the picture,
>
> a second quantizer estimator having an input for the complexity indicators and past values of quantizer selections and coding rates achieved therefrom, the second quantizer estimator to generate a second quantizer estimate for the picture based on a linear regression modeling of the prior quantizer selections and coding rates for like-kind pictures, and

> a coding adapter, having inputs for the two quantizer estimates and the complexity indicators to select a quantizer for the picture based on a difference of the two quantizer estimates.

As a threshold matter, Applicants have reviewed the Office's response to Applicants' arguments regarding Hsia (Office Actions dated Apr. 13, 2009, pg. 2 ***and*** Nov. 27, 2009, pg. 2) and fail to see the relevance of the Office's comments to independent claim 15. The Office states in its comments that the "Q_slice disclosed represents the entire frame when the frame is an I-frame thus all slices are equal" and that "complexity is represented when there are a number of slices within the frame that are different." As a preliminary matter, Applicants can find no teaching of either of these statements within Hsia (e.g., Hsia says *nothing* of complexity). Furthermore, by the Office's logic, an I-frame can have no complexity associated with it because all of its slices are equal, which simply is not correct. Finally, claim 15 says nothing of I-frames. If the Office maintains its rejection based on these portions of Hsia, Applicants respectfully request the Examiner to explain her reasoning in greater detail so Applicants can respond in a meaningful way.

The Office further states in its comments that Hsia teaches "the comparison of the current and previous quantization value." Applicants respectfully disagree. While the Scene Change Detection block of Hsia's Scene Detection Module takes two quantizer values as two of its four inputs, neither of these is either of the quantizer estimates as recited in claim 15 (as detailed below). In any event, the Scene Change Detection block does not select a quantizer for the picture based on a difference of the two quantizer estimates as is required by claim 15, but rather determines whether there has been a scene change. (Hsia, FIG. 3, para. 45).

In the current Office Action, the Office cites the Scene Detection Module, Quantization Decision Module, and Picture Type Decision Module of FIG. 3 as disclosing the scene content analyzer, however, none of these modules discloses an output for complexity indicators representing complexity of each picture in the source video data. (Hsia, FIG. 3, paras. 44-46). The Picture Type Decision Module outputs the picture type of the current frame (Hsia, FIG. 3, para. 43); the Quantization Decision Module outputs a quantization scale for each slice (Hsia, para. 44); and the Scene Detection Module outputs either a low or high scd signal depending on whether a scene change is detected (Hsia, FIG. 3, paras. 43 and 45).

The Office asserts also that Hsia's Quantization Decision Module discloses both the first and second quantizer estimators of the subject claim. Applicants respectfully disagree. First, the Quantization Decision Module is concerned with quantization scales for ***slices of pictures***, and not quantization estimates of ***pictures***. Moreover, the Quantization Decision Module outputs only a single quantization scale (i.e., *Q_Slice*) for each slice, not ***two***, separately-derived quantization estimates for each picture as is recited in the subject claim. (Hsia, para. 44). Second, the Quantization Decision Module does not have an input for the complexity indicators and past values of quantizer selections and coding rates achieved therefrom.

As with independent claim 1, the Office asserts that the linear regression element is taught or suggested by Ribas-Corbera. For reasons similar to those applicable to claim 1, Applicants respectfully disagree.

Finally, and as discussed above in conjunction with the Office's comments, Hsia does not teach a coding adapter, having inputs for the two quantizer estimates and the complexity indicators to select a quantizer for the picture based on a difference of the two quantizer estimates. While the Scene Change Detection block of the Scene Detection Module takes two quantizer values as two of its four inputs, neither of these is either of the quantizer estimates as claimed, and the Scene Change Detection block does not select a quantizer for the picture based on a difference of the two quantizer estimates, but rather determines whether there has been a scene change. (Hsia, FIG. 3, para. 45).

For at least these reasons, Applicants believe that the rejection of claim 15 should be reconsidered and withdrawn. Claims 16-20 depend from independent claim 15 and are allowable for at least the reasons applicable to claim 15, as well as due to the features recited therein.

CLAIM 17 DEFINES OVER THE PRIOR ART

Dependent claim 17 recites:

> The rate controller of claim 15, wherein the coding adapter comprises:
> a subtractor having inputs for the two quantizer estimates, and
> a clipper coupled to an output of the subtractor.

The combination of Hsia, Hurst and Ribas-Corbera does not teach or suggest the rate controller recited in claim 17. The Office cites the Scene Detection Module in FIG. 3 of Hsia as teaching a subtractor having inputs for two quantizer estimates. For reasons similar to those applicable to the "coding adapter" recited in claim 15, Applicants respectfully disagree.

Also, the Office cites FIGS. 2-3 and 7 of Hurst as teaching a clipper ***coupled to an output of the subtractor***, but Applicants can find nothing in the descriptions of these figures or in the cited passages (i.e., 4:18-35 and 4:58-65) that corresponds to the clipper as claimed.

For at least these reasons, Applicants believe that the rejection of claim 17 should be reconsidered and withdrawn.

CLAIM 18 DEFINES OVER THE PRIOR ART

Dependent claim 18 recites:

> The rate controller of claim 17, further comprising a divider coupled to the output of the clipper.

The combination of Hsia, Hurst and Ribas-Corbera does not teach or suggest the rate controller recited in claim 18. The portions of Hurst cited by the Office as teaching the claimed divider seem to say nothing of a divider, much less one that is coupled to the output of the clipper.

For at least these reasons, Applicants believe that the rejection of claim 18 should be reconsidered and withdrawn.

CLAIM 20 DEFINES OVER THE PRIOR ART

Dependent claim 20 recites:

> The rate controller of claim 15, wherein the coding adapter comprises a lookup table indexed by a complexity indicator representing complexity of the picture and the picture's coding type.

The combination of Hsia, Mitchell and Ribas-Corbera does not teach or suggest the rate controller recited in claim 20. The Office cites the following from Mitchell as teaching a lookup table indexed by a complexity indicator representing complexity of the picture and the picture's coding type:

> The quantization described in the background is the linear quantization used in international image data compression standards such as JPEG and MPEG. There is no requirement that the quantization be linear. Any mapping that reduces the number of transform data levels in a deterministic way can be used with this invention. [...] Actual embodiments may use a lookup table or a sequence of comparisons to achieve similar results.

(Mitchell, Col. 6, lines 26-34). Nowhere in Mitchell is it taught that the lookup table is indexed by a ***complexity indicator representing complexity of the picture and the picture's coding type***.

For at least these reasons, Applicants believe that the rejection of claim 20 should be reconsidered and withdrawn.

CLAIMS 21-26 AND 42-47 DEFINE OVER THE PRIOR ART

Independent claim 21 recites:

> A method for identifying a scene change from a sequence of video data, comprising:
>
> for a plurality of macroblocks of an input picture, computing, via a video coder, variances of a plurality of blocks therein,
>
> comparing, via the video coder, minimum variance values of the plurality of macroblocks to corresponding minimum variance values of macroblocks from a prior picture,
>
> calculating, via the video coder, an activity level of the input picture from the variances,
>
> ***comparing, via the video coder, the activity level of the input picture to an activity level of the prior picture, and***
>
> ***generating, via the video coder, a scene change decision from the two comparisons.***

The combination of Pau and Ar does not teach or suggest the method for identifying a scene change as recited in claim 21. In particular, the combination of Pau and Ar does not teach at least comparing the activity level of the input picture to an activity level of the prior picture; and, generating a scene change decision from the two comparisons. The Office cites the following (minus equations) as teaching the two highlighted elements:

> The motion information thus obtained will be useless as a factor for modification of the quantization spacing if a picture does not have continuity with a picture

> scene change or if the current frame is separate from the preliminarily stored frame. The scene change information is utilized to make the picture motion information meaningful. The scene change information is extracted by comparing variances of macroblock means minimum of each of the four regions of a frame to those of a stored one. It is determined by the algorithm: [EQUATION]
>
> where Vmcn is a variance of mean pixel value of an n-th region of the current frame; Vmpn is similar but about the preliminarily stored frame; Mcni and Mpni are mean pixel values of an i-th macroblock of the n-th region of each frame; and Nrn is the number of macroblocks contained in one region. In computation of the change information, if the below requirement is met and the flag value equals 3 or more, it is determined that picture scene changes. [EQUATION]
>
> If otherwise, it is determined that the opposite is true.

(Ar, 5:7-35). Applicants respectfully submit that nothing within these citations or indeed anywhere within Ar teaches 1) comparing the activity level of the input picture to an activity level of the prior picture, and 2) generating a scene change decision from the two comparisons as described in the subject claim. Indeed, Ar makes no mention of activity levels, much less comparing the activity level of the input picture to the activity level of the prior picture, and then generating a scene change decision from this comparison and the "first" comparison, as claimed. Therefore, the combination of Pau and Ar fails to teach or suggest each and every element of claim 21.

For at least these reasons, Applicants believe that the rejections of claim 21, and claim 42, which recites elements similar to those found in claim 21, should be reconsidered and withdrawn. Claims 22-26 and 42-47 depend from independent claims 21 and 42, respectively, and, therefore, are allowable for at least the reasons applicable to claims 21 and 42, even before they are considered on their merits.

CLAIM 27 DEFINES OVER THE PRIOR ART

The combination of Pau and Ar does not teach or suggest the scene change detector as recited in claim 27. Specifically, Pau and Ar fail to teach at least decision logic to signal a scene change based on a comparison of an output from the comparator ***and the activity level of the source image***. The Office's purported support for the rejection of this element is provided by the same short portions of Ar quoted above in conjunction with claim 21, and Applicants kindly direct the Office to those portions. Ar makes no mention of an activity level, much less

decision logic to signal a scene change based on a comparison of an output from the comparator and the activity level of the source image.

For at least these reasons, Applicants believe that the rejection of claim 27 should be reconsidered and withdrawn.

REQUEST FOR INTERVIEW

Prior to issuance of a subsequent Office Action in the present application, Applicants request a telephone interview be conducted between Applicants' representative and Examiner Holder in order to advance prosecution. Applicants respectfully request the Examiner to contact Applicants' undersigned representative at the number provided below to arrange the interview based on the Examiner's availability and prior to the Examiner taking further action in this application.

CONCLUSION

In view of the above arguments, it is believed that the above-identified application is in condition for allowance, and notice to that effect is respectfully requested. Should the Examiner have any questions, the Examiner is encouraged to contact the undersigned at (408) 975-7500.

The Commissioner is authorized to charge any additional fees or credit any overpayments which may be incurred in connection with this paper under 37 C.F.R. §§ 1.16 or 1.17 to Deposit Account No. **11-0600**.

Respectfully submitted,

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